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EXPERIMENTS

AND

OBSERVATIONS

ON THE

FOLLOWING SUBJECTS;

1. On the preparation, calcination, and medicinal uſes of MAGNESIA ALBA.
2. On the Solvent Qualities of CALCINED MAGNESIA.
3. On the variety in the Solvent Powers of QUICK-LIME, when uſed in different quantities.
4. On Various ABSORBENTS, as promoting or retarding putrefaction.
5. On the comparative Antiſeptic Powers of VEGETABLE INFUSIONS prepared with LIME, &c.
6. On the Sweetening Properties of FIXED AIR.

BY

THOMAS HENRY, APOTHECARY.

> *Utut tamen ſe res habeat, ego bona ſaltem fide tradam quæ hactenus reſcivi omnia.*
>
> SYDENHAM.

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TO

THOMAS PERCIVAL, M.D.
F.R.S. & S.A.

DEAR SIR,

WHEN I reflect how much the friendſhip with which you have favoured me has contributed to my happineſs; that from you has been imbibed a conſiderable ſhare of the ſmall taſte I poſſeſs for experimental inquiries; and that to your ſkilful and affectionate treatment I am greatly indebted even for the health I enjoy; it is impoſſible to heſitate a moment in the choice of a patron: gratitude and eſteem direct me to inſcribe this Treatiſe to you, and I chearfully obey their dictates. If to theſe any additional motive had been wanting, I ſhould have received it from your having been an evidence to the reſult of many of the experiments related in the following pages.

THAT your own health may long enable you to continue exemplarily uſeful to your friends and to the public, is the ſincere and ardent wiſh of,

DEAR SIR,

Your truly affectionate

and very humble Servant,

MANCHESTER,
18th Jan. 1773.

THOMAS HENRY.

THE

PREFACE.

A RIGHT compoſition of the ſeveral articles uſed in medicine, is of ſo much importance to the practice of it, that every attempt to improve or aſcertain the method of preparing them, cannot fail of a candid reception from the public.

THOUGH great advancement has been made within theſe few years in chemical pharmacy, by the labours of the very ingenious Dr. Lewis, and ſome other writers on chemiſtry and the materia medica, there is ſtill a wide field left for improvement. It is to be wiſhed that Apothecaries, to whoſe province reſearches of this kind more peculiarly belong, and many of whom are well qualified by a liberal education to purſue them with advantage, would give their attention to theſe material intereſts of the art: for while the ſeveral profeſſors of medicine and of ſurgery, are moſt laudably and aſſiduouſly employed in adding to the enlargement of theſe ſciences, why ſhould the ſons of pharmacy remain ſupinely inactive, and leave every thing towards the improvement of their profeſſion to be performed by the members of the elder branch of phyſic, inſtead of contributing *their* ſhare to its ſupport? as if tacitly acknowledging themſelves unequal to the taſk, and thereby incurring the too general, though unmerited, imputation of want of knowledge and ſkill in their department.

THE firſt part of the enſuing Treatiſe, which relates *an improved method of preparing Magneſia Alba*, has been communicated to the College of Phyſicians; and that learned body have done the author the honour to inſert it in the ſecond volume of their

TRANSACTIONS. It is here reprinted as a proper introduction to the ſubſequent pages.

THE calcination of Magneſia is not a new proceſs *(a)*; but, as in this ſtate it is a medicine not much introduced into practice, perhaps a few hints may be ſuggeſted, in regard to its medicinal and pharmaceutical properties, which are not generally known; and it is hoped that ſome

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(a) THE German and Italian chemiſts formerly prepared Magneſia by evaporating the mother of nitre, and then calcining the reſiduum; but, Hoffman having diſcovered the method of precipitating it from the bittern remaining after the cryſtallization of ſea ſalt, the calcination was diſuſed, as tedious and unneceſſary.

ſome uſeful information may be communicated relative to the various action of abſorbent medicines on the bile.

IN the ſucceeding chapters, it is attempted to determine how far, and in what proportion, lime promotes the ſolution of vegetable aſtringents, and other drugs in water; and whether the action of antiſeptic medicines, thus diſſolved, be in any degree impaired or increaſed by this mode of obtaining tinctures from them.

IN endeavouring to contribute to the determination of the queſtion, whether fixed air has the power of reſtoring ſweetneſs to putrid ſubſtances, the Author may at firſt ſight appear to have tranſgreſſed his proper limits; but, as fixed air, if poſſeſſed of this property, is likely to be a valuable acquiſition to the materia medica, he flatters himſelf he ſhall incur no cenſure by the attempt.

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E R R A T A.

Page 8, line 14, after *quantity* read *of water.*
Page 10, line 18, for *interrupt* read *intercept.*
Page 13, line 1, read *is there ſaid.*
Page 16, line 1, read *the other abſorbents.*
Page 29, note, line 4 from the bottom, for *albuminis* read *aluminis.*
Page 31, line 4, for *patients* read *parents.*
Page 83, line 9, after *elegant* read *green.*
Page 126, line 3, eraſe the *comma* after *ſmell.*
Page 127, line 3, place a *comma* inſtead of the *ſemicolon.*

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CHAP. I.

AN ACCOUNT OF AN IMPROVED METHOD OF PREPARING MAGNESIA ALBA.

ALTHOUGH MAGNESIA ALBA is a medicine which has been in general uſe for many years, yet the proper mode of making it is very little known. Our *pharmacopæia* affords us no information about it; and the *formula* which is given by the Edinburgh College, as well as that with which the ingenious Doctor Black *(a)* has favoured us, is deficient in ſeveral circumſtances. Hence the preparation of pure Magneſia has been confined to very few perſons, who have preferred the emolument they have received by keeping their method ſecret, to the more diffuſive utility of which a publication of it would have been productive. *(b)* I therefore beg leave to lay before the

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(a) Eſſays and Obſervations Phyſical and Literary, Vol. II.

(b) Mr. Glaſs, a few years ſince, publiſhed an Eſſay on Magneſia Alba, in which all the information he affords us relative to the preparation is what we knew before, viz. that it is prepared from Epſom ſalts and pot aſhes; and has related a number of difficulties which occur in the proceſs, at the ſame time carefully, I had almoſt ſaid meanly, avoiding giving the leaſt inſtruction which might teach us how to ſhun them, though he has given a long detail of the many tragical conſequences which may attend the uſe of Magneſia prepared under ſuch diſadvantages.

the public a proceſs for the preparation of Magneſia, by which it will be in the power of every Apothecary to make it himſelf, in all reſpects equal to that which is ſold by thoſe who conceal their method.

I am the more ſtrongly induced to make this communication, becauſe the Magneſia which is generally to be found in the ſhops, is either extremely coarſe and ill prepared, or, which is ſtill worſe, ſophiſticated with calcareous ſubſtances, differing greatly from true Magneſia. I have been aſſured by ſome Phyſicians, that they have met with it mixed with chalk, and even with lime, and I have ſometimes ſeen it ſo adulterated: a fraud of very dangerous tendency, as this powder is ſo frequently adminiſtered to very young infants, and to adults of tender bowels and coſtive habits.

This medicine was originally prepared abroad, from the liquor called the *mother of nitre*, which is compoſed of a light earth united with an acid; and theſe being ſeparated, either by a ſtrong fire, or by the addition of an alkali, the powder was waſhed in water, and obtained the name of Magneſia Alba. Hoffman afterwards prepared it from the bittern remaining after the cryſtallization of ſea ſalt, which he found to be ſimilar to the mother of nitre. And the factitious Epſom ſalt being prepared from this bittern, and evidently compoſed of Magneſia and the vitriolic acid, Dr. Black, who has favoured the world with a number of very valuable experiments on this ſubject, made uſe of this ſalt with ſucceſs for the ſame purpoſe.

Happening ſome years ago to live in the neighbourhood of a gentleman who has long been celebrated as the preparer of the moſt genuine Magneſia, and never having been able myſelf to make Magneſia comparable to his, by the commonly known methods, I was deſirous of gaining ſome intelligence as to his proceſs, and was at laſt ſo fortunate as to obtain ſome uſeful hints.

I availed myſelf of theſe, and after repeated trials, produced Magneſia equally pure, white, taſteleſs, light and impalpable with that of Mr. Glaſs; nay ſometimes that of my own preparing has been ſuperiour to his, and in one reſpect has generally the advantage of it, namely, that mine is not ſo ſtiff when dried, and may be reduced to the fineſt powder by ſimple preſſure; whereas *his* requires ſome degree of trituration to break the lumps effectually; which I imagine may be owing to his purſuing Dr. Black's method of drying it, by ſtraining and *preſſing* out the water through a cloth.

The following is the manner of preparing it, which I have found ſucceſsful.

Diſſolve any quantity of *ſal catharticus amarus*, commonly called Epſom ſalts, in its own weight of water; filter the liquor, and add to it by degrees a filtrated ſolution of pearl aſhes in an equal quantity of water, ſtirring them gently until the mixed liquors have acquired the appearance of a complete coagulum: then ceaſe adding any more of the alkaline lixivium; and, having diluted the precipitate, and mixed it intimately with a ſmall quantity of hot water, immediately throw the mixture into a large veſſel of boiling water. Keep it boiling for a quarter of an hour, then take it out, and put it into glazed earthen veſſels. As ſoon as the powder has ſubſided, and before the water be quite cold, pour it off, and add a freſh quantity of boiling water: repeat theſe ablutions with ſeveral parcels of hot water, till the liquor has entirely loſt its ſaline taſte. Then let it be ſo agitated as to ſuſpend the finer parts of the powder; in which ſtate decant it into other veſſels, and having ſeparated the water from the Magneſia by inclination, put it on large chalk ſtones, till a conſiderable part of the

the humidity be abſorbed. Then wrap it up in ſheets of white paper, and dry it before the fire. Pour hot water on the remaining powder, ſtir it, decant it in its turbid ſtate, and ſeparate the Magneſia from the water as before. By theſe means, the whole, or moſt of it, will be reduced to an equal degree of fineneſs.

The ſeparation of the Magneſia will be promoted by heating the ſaline lixivia before they are mixed; and the larger the quantity into which the precipitated powder is caſt, the more ſpeedily and perfectly will the vitriolated tartar, which is formed by the ~~alkali~~ of ac the *ſal catharticus*, be waſhed off. Dr. Black directs that three or four times the quantity of water, to that of the ſolutions, ſhould be added; but this I have found greatly inſufficient. The neutral ſalt ſhould be waſhed off as quickly as poſſible; otherwiſe, as he juſtly obſerves, by allowing the mixture to ſtand for ſome time, the powder concretes into minute grains, which when viewed with a microſcope, appear to be aſſemblages of needles diverging from a point. Theſe concretions cannot be rediſſolved by any waſhing, however long continued. His intention, in boiling the mixture, is much better anſwered, by adding it to the water when in a ſtate of ebullition; and once boiling in this manner is more effectual than a dozen waſhings in hot water.

Much depends on the purity of the water uſed in the proceſs. If it be hard pump water, the ſelenites with which it is impregnated will be decompounded, and the calcareous earth be depoſited, after boiling; which mixing with the Magneſia will render it impure, gritty and diſcoloured. Rain water collected free from impurities, or clear river water, are moſt eligible; but if the ſituation of the operator does not permit him to procure theſe in a proper ſtate, he ſhould either uſe diſtilled water, which has been kept till the empyreuma is gone off, or at leaſt ſuch pump water as is free from any calcareous or ſaline impregnation. When poured on the Magneſia, it ſhould be ſtrained through a thick linen cloth, ſo as to interrupt any accidental impurities which it may acquire in heating.

The drying ſhould be performed with expedition. To this end, the chalk ſtones ſhould be expoſed to a moderate degree of heat; and when they have been employed two or three times, ſhould be dried before a freſh quantity of the Magneſia is put on them. Cleanlineſs ſhould be particularly attended to through the whole proceſs; and the veſſels ought to be carefully covered, that no duſt may enter.

We may ſafely make uſe of a large copper brewing-pan, to boil the Magneſia in; for as the acid is perfectly neutralized, there can be no danger of its quitting the alkali, to which it has a greater affinity than to the metal; and copper does not readily diſſolve, even in acids, when boiling hot; nor have I ever obſerved the leaſt corroſion, though I have frequently uſed ſuch veſſels for this purpoſe.

CHAP. II.

MISCELLANEOUS OBSERVATIONS.

SINCE the drawing up of the paper which has been the ſubject of the laſt chapter, ſome obſervations have occurred, which are either ſo immediately connected with, or at leaſt deduced from it, that it may not perhaps ſeem inexpedient to introduce them in this place.

I was very much ſurpriſed to obſerve, in the Lectures lately publiſhed, *as delivered* by the very learned and ingenious Dr. Cullen, that Magneſia there ſaid to be no more purgative than any other abſorbent earth. The ſentence is this; (ſpeaking of other abſorbents) "Magneſia alba ſhould have been added to this ſet. It has had a conſiderable reputation as an abſorbent, and when neutralized, as a purgative; but I find it is not more abſorbent than any of the reſt, nor more purgative in leſs quantity, as chalk or crab's eyes given in the ſame quantity, viz. ʒij, will have the ſame effect. Therefore it may be neglected."

Surely this muſt have been an error of the perſon who wrote down the lectures, and have eſcaped the notice of the ingenious editors; who, from their ſkill in chemiſtry, muſt know that pure Magneſia differs from every calcareous or teſtaceous earth with which we are hitherto acquainted. Theſe earths are nearly inſoluble in the vitriolic acid, and what part does unite with it, forms a ſelenitical ſalt, the moſt difficult of ſolution of all others, and of an aſtringent nature: whereas the Magneſia*(a)* united with the ſame acid, produces what is commonly called Epſom ſalt, eaſy of ſolution, and purgative to the bowels. The former, with the nitrous acid conſtitutes a calcareous nitre, incapable of cryſtallization; with the marine acid a calcareous muriatic ſalt; and when diſſolved in vinegar, the mixture ſpontaneouſly dries up into a friable ſubaſtringent ſalt: whereas Magneſia, with all theſe acids, forms *purging ſalts*; that with the nitrous

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(a) Eſſays Phyſical and Literary, Vol. II. p. 164.

trous acid, yellow, capable of being reduced into cryſtals retaining their form in a dry air, but melting in a moiſt one: with the muriatic acid, a ſalt is produced which does not cryſtallize, and eaſily melts when expoſed to the air: with diſtilled vinegar, a ſaline uncryſtallizable maſs is formed, reſembling glue both in colour and conſiſtence while warm, but becoming brittle when cold. Dr. Black ſays, that two drachms of this ſalt purged a middle aged man four times; and half an ounce of the ſame gave a woman of a ſtrong conſtitution no leſs than ten ſtools. *(b)*

Beſides, where an acid prevails, much ſmaller doſes than two drachms of Magneſia prove purgative; and it ſeldom happens that even

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(b) Ibid. p. 64.

even that doſe of the abſorbents (c) will produce the ſame effect. Nor am I ſingular in my opinion, when I declare my doubt whether Magneſia be not of itſelf in ſome degree purgative, independent of its junction with any acid whatſoever. It appears to be an earth *ſui generis.* That of alum reſembles it in ſome reſpects, yet differs from it eſſentially, when combined with the vitriolic acid: the alum is ſtrongly aſtringent and antiſeptic, the Epſom ſalt purgative and ſeptic. I have

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(c) Hoffman, having attributed the purgative quality of Magneſia to its forming a bitter cathartic ſalt with the acid it meets with in the ſtomach and bowels, adds, "At vero in contrarium quoddam dubium contra hanc ſententiam moveri poſſe intelligo, quum nempe alia. terrea, quæ prompte ſolvent et abſorbent inhæreſcens primis viis acidum, neutiquam effectum laxantem exſerant. Sed his regerere licet, quod interdum a pulveribus abſorbentibus vel bezoardicis utique alvus fluidior

I have very lately ſeen a paper ſigned by Doctor Cadogan and dated in the year 1767, in which he complains grievouſly of the advertiſers of Magneſia, making uſe of his name without his conſent, and has publiſhed the proceſs for making *his* Magneſia. The doctor's intent in this was doubtleſs benevolent, but his manner of preparing this powder is unneceſſarily expenſive and waſteful.

fluidior fiat, ſi multum acidi primam regionem incolet: vis tamen eorum purgandi non tanta eſt, quanta magneſiæ, quia ſolutiones illorum cum acidis liquoribus factæ non tam eminente ſalino acri, ſed moderate ſalſo ſapore imbutæ ſunt, quam quidem ea, quæ ex magneſia et acidis liquoribus conficitur. Atque adeo ex eo apparet, præter alcali terreum aliud adhuc eſſe in magneſia principium, quod ad mixturam acidi in materiem ſtimulantem et purgantem tranſeat."

Hoffman. Animadverſiones et experimenta circa Magneſiam, &c. Op. Tom. 4. p. 480.

ful. He directs only one pound of lixivium tartari to five pounds of ſal catharticus amarus, which is greatly inſufficient to precipitate all the Magneſia. And he inſiſts ſtrongly on the ſuperiority of the lixivium prepared from ſalt of tartar, to that made of pot-aſhes, as if the chemical effects of one, were different from the other. But, ſays the Doctor, pot-aſhes render the Magneſia bitter. Surely the vitriolated tartar produced by a union of one vegetable fixed alkali with the vitriolic acid, is equally ſoluble in water with that prepared with any other, and if ſo, will be as eaſily waſhed off from the Magneſia.

But behold a champion ſteps forth, and at one blow levels to the ground the whole tribe of Magneſia makers, who have procured it from the factitious Epſom ſalts. I confeſs I have not had the happineſs to peruſe this ingenious gentleman's pamphlet on the ſubject, but I have formed a very extraordinary opinion of his *candour*, *modeſty*, *and knowledge*, from the very curious paper which he diſtributes with his Magneſia. Notwithſtanding Doctor Black, and ſince him Mr. Glaſs and ſeveral others, have procured *pure* Magneſia from the factitious Epſom ſalts, Mr. Dale Ingram, aſſures us, that he has made an improvement, "which is by the learned eſteemed one of the greateſt acquiſitions to the materia medica." And wherein does this mighty diſcovery conſiſt? even that Magneſia prepared from the waters of Epſom, is ſuperiour to that prepared from the bitter purging ſalt; and he aſſures us that the Magneſia ſold by him is ſo prepared.

To the firſt aſſertion I ſhall only reply, that every perſon at all converſant in chemiſtry knows that Magneſia earth is the ſame, from whatever ſubſtance it can be ſeparated in a pure ſtate; that the factitious Epſom ſalt yields it in as great a degree of purity as the ſalt of the Epſom water, and that Dr. Alſton aſſures us, the artificial ſalt "by various and repeated experiments, made in France as well as in Britain, is demonſtrated to be every way as good as, yea to be the very ſame with, the genuine made of the Epſom waters." *(d)*

As to the other declaration, it will

(d) Alſton's Materia Medica, Vol. I. p. 164.

will be ſufficient to obſerve that one gallon of Epſom water contains only ſeven drachms of ſalt in a dry ſeaſon, and hardly ſix drachms in a wet one ;*(e)* and that for this ſalt to precipitate its Magneſia properly, it is neceſſary it ſhould be diluted with little more than its own weight of water.*(f)* Six drachms of ſalt will yield two drachms of Magneſia. So that to procure a pound of this powder Mr. Ingram muſt evaporate above ſixty gallons of the water, to between five and ſix pints, before he begins the precipitation. Sure never did empiriciſm appear ſo thinly diſguiſed !

In the preceding chapter, the neceſſity of uſing water free from any calcareous impregnation has been

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(e) Ibid.

(f) Eſſays Phyſical and Literary, p. 163.

been particularly inſiſted on, and I have, on another occaſion,*(g)* obſerved that great attention ſhould be given to the purity of the water uſed in the making of all the ſaline preparations; and I may add in almoſt all the operations of pharmacy. Dr. Percival, in his ingenious experiments on water, found a quart of the Mancheſter pump water to contain upwards of ſixty grains of adventitious matter.*(h)* Suppoſe therefore, for inſtance, that in making the extract from a pound of peruvian bark, it be boiled only ſix times in the quantity of water directed by the London Diſpenſatory, nine gallons will be conſumed in the proceſs; which is a very moderate allowance, ſix coctions not

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(g) Vide Percival's Eſſays, 2d. Edit. p. 321.

(h) Ibid. p. 87.

not being ſufficient to extract all the virtues of that drug. Dr. Percival boiled half an ounce of bark twenty five times, in ſo many different pints of water, the laſt of which had ſome impregnation, and the reſiduum gave a deep colour, and conſiderable bitterneſs to rectified ſpirit of wine. If we likewiſe ſuppoſe only one half of the foreign contents of ſuch water to be left by evaporation, then the quantity of calcareous and ſaline matter, undeſignedly mixed with the extract, will be two ounces and two drachms, or nearly equal to the quantity of extract procured from a pound of bark by pure water. Thus this important medicine beccmes groſſly adulterated, without any ſuch intention in the operator; and I know it is the common practice to uſe pump water in making it.

I have particularly ſelected the Peruvian bark, as requiring a very large quantity of water to extract the whole which it is capable of yielding; but the proportion of water which I have here allowed, will not be too great in obtaining extracts from moſt vegetable ſubſtances; and how greatly not only the quantity, but the quality of the medicine muſt be affected by the admixture of ſuch a weight of inſoluble calcareous earth, is ſo obvious, that it is needleſs to expatiate on it.

CHAP. III.

ON THE MEDICINAL PROPERTIES OF MAGNESIA ALBA.

THE medicinal uſes to which Magneſia has hitherto been applied are in general ſo well known, that it will be neceſſary only to give a ſhort ſummary of the caſes in which it is beneficial, for the information of young practitioners, and of thoſe of my readers who may not be acquainted with medical ſubjects, this medicine being frequently adminiſtered ed without the advice of a phyſician. If it ſhould appear in the ſubſequent part of this treatiſe that Magneſia is poſſeſſed of any properties hitherto unſuſpected in it, the ſagacious reader will in a great meaſure be left to draw his own practical inferences therefrom.

MAGNESIA ALBA is a powerful abſorbent, and is given with great ſucceſs in diſorders of the ſtomach and bowels ariſing from acidity. This preparation had been introduced into the materia medica abroad ſeveral years before it attracted the attention of our countrymen. The celebrated Hoffman having ſtrongly recommended it to the medical world, ſome Engliſh practitioners began to preſcribe it, and Dr. Cadogan beſtowing high encomiums on it, in his treatiſe on the nurſing and management of children, it ſoon made its way into general practice, and ſupplied the place of the teſtaceous powders and chalk, which before this period were the medicines uſually given to correct acidities in the primæ viæ. The acquiſition of this medicine was of the more importance, on account of its entire and eaſy ſolution in acids, and of the purgative quality which it poſſeſſes; whereas the common abſorbents are apt to form concretions, and to induce coſtiveneſs; ſtrong objections to their free exhibition, as theſe properties render them peculiarly unfit for the bowels of tender infants who are particularly liable to diſeaſes of this claſs.

This tendency to acidity genenerally attends children during the firſt months and the time of dentition, and diſcovers itſelf when too redundant by the green ſtools, ſour vomitings, gripes and purgings which it occaſions: and as the nerves of children are extremely irritable, ſpaſmodic affections are often the conſequence of this acrid ſtimulus being retained in their bowels. In theſe caſes Magneſia may be adminiſtered in doſes from five to twenty or thirty grains, according to the age of the infant; and in proportion as it is intended to act, either as an alterative, or as an eaſy purgative.

It has been a common practice to give Magneſia to children as a preventive, and to mix it for this purpoſe with their food, in order to correct that diſpoſition which milk and the farinaceous aliments have to turn ſour. This however ſhould be done with caution, for it is only the exceſs of acidity which is prejudicial to infants,(*a*) ſome degree of it is neceſſary; and ſhould we too officiouſly and entirely deſtroy, what we ought only to reſtrain within due bounds, we may create diſorders of an oppoſite nature to thoſe we have endeavoured to prevent, and inſtead of an acid, produce an alkaleſcent diſpoſition in the firſt paſſages. Indeed I fear that diſeaſes

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(*a*) Hactenus monſtravimus, ſicut cordis, muſculorumque vires debiles erant, ita et ſolidorum quoque ſtatum neceſſariò imbecillem fuiſſe, et ſuccos tenues, dilutoſque; ut natura ampliationem vaſculorum facilius efficeret, et incrementum animale minori cum moleſtiâ perageret. Sed ne ſtatus iſte tonuſque partium debilis laxuſque ultra modum procederet (quod ſæpe accidit, morboſque excitare ſolet) acidum quoddam juvenilium animalium ſtomachis datum eſt, quod quamvis albuminis inſtar, lac coagulat, atque ob eam cauſam aliquando morbum procreat, tamen fibrarum tonum aſtringet confirmatque, et putredinem omnem alka-

eaſes have been more frequently created than obviated by the uſe of preventive medicines, and they ſhould only be allowed in caſes where the approach to diſeaſe is manifeſt. But when a child is in a healthy ſtate, the beſt means to preſerve him from a ſuperabundant acidity, is to pay due attention to the regulation of his diet, to give him proper exerciſe, not to confine him too much in the foul air of hot unventilated rooms, to waſh his whole body every day in cold water, and to rub him very well night and morning with a dry flannel,

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alkalinam, a qua alioquin periculum eſſet, reprimit. Quod quidem videri eſt, vel in coagulo ſtomachi vitulini, vel in aliis animalibus: ſed iſtud tamen acidum, quod infantibus tam idoneum eſt, redundat fortaſſe nonnumquam, et vel per teſtaceas pulveres, vel per medicamenta antiacida, ut ſupra dixi, corrigi debet.

Ruſſelli Œconomia Naturæ, p. 56.

flannel, taking care that his ſtomach be not too full at the time when this friction is performed.

Nor would I adviſe patients to rely with too much ſecurity on the virtues of this medicine, where the diſorders of their children are complicated, or obſtinate. The advice of the ſagacious and diſtinguiſhing practitioner will then be neceſſary to direct what method of treatment is to be purſued. Nor can I here avoid lamenting that the management of children when diſeaſed, is ſo often in the hands of nurſes and ignorant women, from an abſurd notion that their diſeaſes are not proper ſubjects of medical inveſtigation; when in truth, there are none which require a clearer judgement, a quicker penetration, or a greater ſhare of medical knowledge in the preſcriber.

During the period between dentition and puberty, the diſeaſes attendant on a lax fibre ſtill continue, though not ſo predominantly as in the former ſtage; yet aceſcency is the manifeſt cauſe, or at leaſt the concomitant of many of the complaints to which children are at this time liable. To this they are diſpoſed, notwithſtanding the change in their diet to a more alkaleſcent kind, by the great quantities of fruit, frequently crude and unripe, cakes, and other ſweet and greaſy food with which they are too often indulged. By theſe errors their bowels are overcharged, their digeſtion impaired, and the aliment remaining too long in the ſtomach becomes ſour, and occaſions vomitings, head achs, and other complaints which are often thought to proceed from worms, and indeed are frequently attended with that diſorder; as the crudities thus generated in the bowels ſerve as a nidus for theſe deſtructive vermin. Here likewiſe Magneſia may be of conſiderable advantage as an alkaline purgative, neutralizing the offending acid, and at the ſame time promoting its diſcharge by ſtool. But if the ſtomach be overloaded with mucus or undigeſted aliment, a gentle vomit ought to precede the exhibition of the Magneſia.

And even in a more advanced ſtage of life, perſons of weak habits, and who lead ſedentary lives, are often afflicted with indigeſtion, ſour eructations, heart-burn, vomitings, and coſtiveneſs. Theſe diſorders very frequently attend women during their ſtate of pregnancy, and are ſometimes almoſt inſtantly removed by the uſe of Magneſia. Dr. Watſon *(b)* has publiſhed the caſe of a pregnant woman, who was afflicted with ſuch ſevere vomitings as to bring on convulſions, hiccoughing, and violent pain at her ſtomach. What ſhe brought up was acid, and ſo very acrimonious, as to inflame and excoriate her mouth and throat; and the great uneaſineſs ſhe felt at her ſtomach upon ſwallowing any liquor that had the leaſt degree of acrimony, or was more than lukewarm, made it probable that the internal ſurface of the ſtomach was affected in the ſame manner. In this deſperate ſituation, after a variety of remedies had been tried in vain, the ſtomach

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(b) Medical Obſervations and Inquiries, Vol. III. p. 335.

mach was waſhed with unſalted mutton broth, till the liquor was diſcharged without any acid taſte. Her pain was by this means abated, but in about two hours was apparently returning with the ſame violence as before. This ingenious Phyſician then directed a drachm of Magneſia to be given in mutton broth, and to be repeated as often as her pain returned, without any regard to the quantity the whole might amount to, ſuppoſing her pain to continue ſevere. The firſt doſe relieved her, and in three days ſhe took three ounces of Magneſia; and in the next three days, two ounces more, by which time all her ſymptoms were removed. It is remarkable in this caſe that a hypercatharſis was not the conſequence of taking ſo large a quantity of Magneſia, where there was ſo much acid to neutralize it.

In bilious habits, where there is generally a diſpoſition in the ſtomach contrary to acidity, Magneſia is uſually eſteemed to be improper, taken alone: but I am dubious whether this opinion is well founded, and many reaſons for theſe doubts may be deduced from the experiments hereafter to be recited. However, where putrid bile is to be corrected and diſcharged, by ſtool, very good purpoſes may, perhaps, be anſwered by taking the Magneſia, joined with a ſufficient quantity of acid to neutralize it, while in a ſtate of effervesſcence; or by ſwallowing the Magneſia and the acid, one immediately after the other, ſo as to produce the fermentation in the ſtomach: for thus the fixed air with which the Magneſia ſo greatly abounds, being let looſe, may powerfully correct the tendency to putridity in the contents of the primæ viæ, and at the ſame time evacuate them downwards.

How far Magneſia may be of ſervice in diſeaſes of the ſkin I do not take upon me to determine. Several authors have attributed cutaneous eruptions, and indeed the ancient chemiſts aſcribed almoſt all diſorders, to the preſence of an acid in the blood; whilſt others abſolutely deny that an acid can be admitted into the lacteals, or, if admitted, exiſt in the blood in a ſtate of acidity. In theſe caſes however, if an acid acrimony abounds in the ſtomach and bowels, with a coſtive habit, and pale complexion, Magneſia will be a uſeful corrector, and entering into the circulation in the form of a mild neutral ſalt, may act as an excellent alterative, *(c)* proving both diaphoretic and diuretic.

Having thus given a curſory detail of the medicinal properties of Magneſia, in its natural ſtate, I ſhall now proceed to conſider it in a ſtate of calcination: but before any deſcription of its uſes in medicine be given, it may be proper to take a view of the changes which are produced in the nature of it by this operation.

(c) Neque enim tantum abſorbentem et catharticam, ſi acidum primâ in regione ſtabulatur, virtutem exſerit; verum etiam ſi in remiſſiore doſi, ad grana xv. vel xx. uſurpatur, diaphoreticum et diureticum effectum ſequi, non ſemel obſervavimus.

Hoffman. circa Magneſiam. Oper. tom. 4. p. 481.

CHAP.

CHAP. IV.

ON THE CALCINATION OF MAGNESIA ALBA.

THE free ſpirit of inquiry, and taſte for experimental reſearches which have of late ſo happily prevailed, have given riſe to ſeveral very important diſcoveries in the courſe of the laſt half century; among which, thoſe of the properties of the electrical fluid, and of fixed air, hold a principal rank. That excellent philoſopher and experimentaliſt, the late Doctor Hales, firſt proved that moſt bodies contain, as one of their component principles, a quantity of air, differing from that of the common atmoſphere in ſeveral of its properties. The proportion of this element varies in different ſubſtances, and in ſome conſtitutes nearly one half of their weight. All calcareous earths, the teſtaceous powders, Magneſia and alkaline ſalts contain it abundantly, and have the ſtrongeſt affinity with it of any bodies, except metals. From all theſe it is diſcharged by an acid, and the ſtronger the acid is, the more ſudden and plentiful is the diſcharge of this vapour, which is of the ſame nature as that emitted by fermenting liquors. Though it may be inſpired in ſmall quantities with impunity, and, as appears from ſome late obſervations, even with advantage in ſome caſes,*(a)* yet it is a known fact that animals expire ſooner in a receiver filled with fixed air, than in vacuo. Laſtly, it is ſaid to have the remarkable property of rendering putrid ſubſtances ſweet.

In the precipitation of Magneſia, the acid of the Epſom ſalt uniting with the alkali which is added to the ſolution, expels the fixed air which the latter contains; but the vapour inſtead of being diſſipated as in the common effervеſcing mixtures of acids and alkalis, is quietly and immediately abſorbed

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(a) The reader is referred for further information on this ſubject, to an excellent Treatiſe on the Management of Pregnant and Lying-in Women, lately publiſhed by my worthy and ingenious friend Mr. White; to a volume of Experiments and Obſervations, by Dr. Percival, which is now in the preſs; and to ſome very curious papers on factitious air, which have lately been communicated to the Royal Society, by Dr. Prieſtley.

abſorbed by the Magneſia earth, to which it has a ſtrong affinity; and thus a double elective attraction takes place.

The very large proportion of this element contained in Magneſia Alba has given Dr. Black an opportunity of throwing much light on this hitherto obſcure ſubject; and that excellent chemiſt has drawn ſuch inferences from the reſult of his experiments on Magneſia, Quicklime, and other alkaline ſubſtances, as are of the utmoſt importance to chemiſtry. As this treatiſe may fall into the hands of ſeveral who may not have an opportunity of peruſing the valuable Eſſays in which theſe experiments are contained, I ſhall take the liberty to make a ſhort extract from them, in order to elucidate the ſubject of the ſubſequent pages.

The firſt object of Dr. Black's enquiry was, whether Magneſia could be reduced to Quick-lime. To this purpoſe, he calcined an ounce of Magneſia in a ſtrong fire. When taken out of the crucible and weighed, it had loſt ſeven twelfths of its weight. Combined with different acids, it formed ſalts of a ſimilar nature to thoſe conſtituted by the ſame acids with the uncalcined powder; but diſſolved in them without the leaſt degree of efferveſcence.

It ſlowly precipitated the corroſive ſublimate of mercury, in the form of a black powder; whereas before calcination a dark red precipitate was formed from the ſame ſubſtance. Mixed with a warm ſolution of ſalt ammoniac, it ſeparated the volatile alkali from the acid; but it made no ſeparation of an acid from a calcareous earth, nor did it induce any change upon lime-water; whereas in an uncalcined ſtate, it rendered quick-lime mild. Laſtly, being digeſted for ſome hours with water, it produced not the leaſt alteration in the water. *(b)*

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(b) In making this experiment ſome time ſince, I imagined that Doctor Black had been miſtaken in this point, and that ſome impurity in the water had prevented the ſucceſs of his proceſs, for I found the water impregnated, as I ſuppoſed, with the Magneſia. Fluſhed with my ſuppoſed ſucceſs, I proceeded to make experiments on the lithontriptic powers of this water, which I found to be very conſiderable, acting more efficaciouſly on the human calculus, than either oyſter-ſhell lime water, or a dilute ſolution of ſoap ley. I communicated this intereſting intelligence to ſome of my medical friends; but on repeating my experiment ſeveral times with different parcels of Magneſia, that the truth of the fact might be abſolutely aſcertained, I at laſt was convinced, to my no ſmall mortification, that

In purſuing his inquiries, he found that a very ſmall portion of what

that what I had too ſanguinely flattered myſelf to be a diſcovery likely to be highly ſerviceable to mankind, was founded on error; and that the properties communicated to the water proceeded from ſome calcareous matter which the Magneſia had received by being waſhed with impure water. I mention this as a caution to every young experimentaliſt, to be extremely careful in drawing concluſions. However, as ſomething may be learned, even from an unſucceſsful experiment, it proves that a very ſmall quantity of lime is ſufficient to impregnate a large quantity of water; for I uſed the calcined Magneſia, in the ſame proportion as lime is directed for making lime-water, ſo that very little of it could be quick-lime. And as oyſter-ſhell lime water is a ſuperiour ſolvent of the calculus to the water prepared with ſtone lime, is there not ſome reaſon to think that the calcareous earth, which has been diſſolved in hard water, may, when calcined, be a more powerful lithontriptic, than either of the others? If any inference can be drawn from it, which may in the leaſt promote the intereſts of mankind, I ſhall be ſufficiently recompenſed for the humiliating circumſtance of recounting an erroneous experiment.

what had been loſt in the calcination was water, and that the other part was fixed air, by the loſs of which the Magneſia was deprived of its power of effervescing with acids. And from hence the Doctor concluded, that the change made in calcareous ſubſtances and in Magneſia by calcination, was chiefly produced by depriving them of this air; and that this volatile Proteus may be conveyed from one body containing it to another body with which it has a greater affinity.

Thus lime being deprived of its air by calcination, and having a ſtronger affinity with it than alkaline ſalts have, being mixed with a lixivium of theſe ſalts, abſorbs all the air from them, deprives them of their property of effervescing with acids, and renders them more acrid, at the ſame time that the lime becomes mild, and incapable of impregnating water, but recovers its power of fermenting when mixed with an acid.

CHAP. V.

ON THE MEDICINAL VIRTUES OF CALCINED MAGNESIA.

FREQUENT objections have been made to the uſe of Magneſia Alba, on account of the great quantity of air which enters into its compoſition. Whenever it meets with an acid in the ſtomach they immediately unite; but in forming this union, all the air contained in the Magneſia is diſcharged with a great degree of effervеſcence, and recovering its elaſticity ſometimes occaſions very uneaſy ſenſations in weak bowels, *(a)* inflating and diſtending them overmuch, inducing griping pains, and above all a ſenſe of debility or ſinking, which is not eaſily deſcribed.

My much reſpected friend Doctor Percival, who had often complained of theſe diſagreeable effects from the uſe of Magneſia, ſuggeſted to me the idea of depriving it of its fixed air by calcination, having been informed that they would be obviated

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(a) Neque tamen præterire poſſumus, id incommodi nos quandoque ab hoc Magneſiæ pulvere deprehendiſſe, quod flatulentias et morſicationes in imo ventri reliquerit, ſi videlicet frequentius in uſum trahatur, primaque regio progignendis corroſivis ſuccis, ut in hypochondriacis fieri ſolet, expoſita ſit.

Hoffman. Oper. Tom. 4. p. 381.

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viated by this method. Doctor Black had indeed proved the practicability of the proceſs, but he does not appear to have made trial of the calcined Magneſia as a medicine. In conſequence of the above hint I calcined ſome Magneſia, and was afterwards inſenſibly led to make further experiments, the event of which, I hope, will be deemed of ſufficient importance to apologize for my communicating them to the public.

EXPERIMENT II.

Eight ounces of pure Magneſia Alba were calcined with a ſtrong fire in an air furnace. Three hours calcination were neceſſary to diſcharge the whole of the air from the Magneſia. When removed from the fire, it had loſt four ounces and three drachms of its original weight, and produced no effervefcence with acids; it had not acquired any degree of acrimony to the taſte, and when thirty grains of it were diluted with a few ſpoonfuls of water and ſwallowed, it occaſioned no uneaſy ſenſation in my ſtomach, nor ſenſe of heat in my throat; proved nearly as aperient as a double quantity of uncalcined Magneſia, and operated without the leaſt griping. It was remarkable that calcination had not reduced the powder in bulk, in proportion to the diminution of its weight.

By the proceſs of this experiment, Magneſia Alba is not only diveſted of the diſagreeable qualities which have been alluded to, but acquires new properties which render it likely to anſwer ſome very important practical purpoſes.

Doctor Macbride, who has with the greateſt ingenuity and accuracy, proſecuted the inveſtigation of the nature of fixed air, diſcovered, that a large quantity of it is diſcharged in the fermentation of alimentary mixtures; and that the ſaliva being, in a healthy ſtate, void of air, acts as an abſorbent of it, thereby moderating and reſtraining the diſcharge of this vapour in the ſtomach. But when the tone of that viſcus is too relaxed to perform the digeſtion of the aliment with proper vigour, or the ſaliva is diſeaſed and corrupted, the air expelled from the food becomes too elaſtic, and produces thoſe diſorders which are commonly termed flatulent; and, perhaps, by its effects on that prodigious plexus of nerves which is diffuſed over the coats of the ſtomach, may ſometimes occaſion ſpaſmodic or paralytic affections.

It has been obſerved above, that calcareous earths, alkaline ſalts, and Magneſia, being deprived of their air, attract it from every ſubſtance with which it has a ſmaller degree of affinity. The two former becoming highly cauſtic by the loſs of their air cannot be adminiſtered but in very ſmall doſes. But the calcined Magneſia being abſolutely diveſted of air, though not rendered acrimonious, and being able to abſorb a large quantity of this elaſtic flatus, may act more powerfully than the whole tribe of carminatives, yet eſſentially differs from them in many reſpects. *They* contain a large quantity of air; *Magneſia* in this ſtate is entirely free from it; *Aromatics* may be apt to ferment, and increaſe acidities; the *calcined Magneſia* is incapable of effervescence, and powerfully corrects an aceſcent diſpoſition in the gaſtric juices; the *former* conſtipate the belly; the *latter* is laxative.

From this property of Magneſia, when calcined, of abſorbing air, it occurred to me, that it would of all others be the moſt proper cathartic for patients labouring under the ſtone, who might be taking the lixivium ſaponarium, having the advantage over all the vegetable purgatives, which abound with air, and conſequently have a tendency to render the cauſtic alkali mild and inert. I even flattered myſelf that it might coincide in promoting the efficacy of that powerful ſolvent of the human calculus. Dr. Macbride's theory, that the lixivium acts by depriving the calculus of its fixed air, appears to be well founded; and Mr. Chittick in the exhibition of his noſtrum, which, notwithſtanding all his empirical arts to diſguiſe it, is now known to have been the ſoap ley, kept his patients from every kind of diet abounding with air. We may therefore venture to recommend it, though not as a lithontriptic, being inſoluble in water, yet as an aſſiſtant to the lixivium, by abſorbing a part of that air in the primæ viæ which would otherwiſe be attracted by the cauſtic alkali, and thereby render it incapable of acting on the calculus.

In all the diſeaſes attended with an aceſcent diſpoſition in the firſt paſſages, in which Magneſia has been recommended in the third chapter, the calcined powder may be given with ſuperiour advantages, as it will not produce any of thoſe inconveniences which have been attributed to that medicine when uncalcined. Beſides that it will act in a threefold capacity, viz. as an abſorbent of air, and of acidity, and alſo as an eaſy purgative. I know ſeveral perſons who could never bear to take the common Magneſia, with whom the calcined perfectly agrees. It ſeems likely to be very ſerviceable in flatulent cholics, and I have been informed of one very obſtinate chronical caſe of that kind, which was greatly relieved, though not perfectly cured by the uſe of it in the

Cheſter Infirmary, under the direction of a very judicious and ingenious phyſician.

Even in gouty habits, joined with ſome warm aromatic, it may probably be found uſeful in correcting the very great flatulency which ſo much afflicts perſons of this conſtitution; and perhaps the Cayenne pepper would be the moſt proper addition to it, on account of the ſmall quantity of this ſpice that would be neceſſary to make the Magneſia gratefully warm to the ſtomach.

It will appear in the ſucceeding chapter that calcined Magneſia is ſtrongly antiſeptic: but I ſhall poſtpone my obſervations on that ſubject till I have related the experiments which prove its claim to that property.

C H A P. VI.

ON THE ACTION OF VARIOUS ABSORBENTS AS PROMOTING OR RETARDING PUTREFACTION.

THE whimſical and ill-grounded hypotheſes which were framed by the chymiſts of the ſixteenth century, had, unhappily, too much influence, on the medical practice of that and the ſucceeding age. Among other falſe theories which the phyſicians had adopted from them, was that of attributing the origin of moſt diſeaſes either to an acid or alkaline cauſe: but the former, being more obvious to the ſenſes, was ſuppoſed to be the moſt frequent parent of diſeaſes. Among others, fevers, even of the putrid kind, were imagined to be occaſioned by an acid, and from hence the teſtaceous medicines acquired ſo high a degree of reputation, as to be deemed the grand correctors of acrimony, and were almoſt univerſally preſcribed as alexipharmics; and the moſt celebrated compoſitions which are ranged under that head, contain a large proportion of theſe powders.

But a very learned phyſician, by a ſeries of accurate and ingenious experiments on ſeptics and antiſeptics, has proved that chalk and all the teſtaceous powders accelerate the corruption of animal fleſh, and from the reſult of one he made on bile with crab's eyes, he naturally concluded that all theſe ſubſtances would produce the ſame effect on that humour, as they had all uniformly proved ſeptic to fleſh. Yet, even upon this ſuppoſition, he candidly allows, that in ſome fevers, they may have their uſes, even where no offending acid exiſts; as in order to cure ſome diſeaſes, it may be requiſite to attenuate the humours, and relax the fibres by a degree of putrefaction, and that poſſibly the criſis of fevers of this kind, may be haſtened or perfected by the teſtaceous powders.

In diſeaſes, however, where the diſpoſition to putreſcency is already too ſtrong, all medicines, which in the ſmalleſt degree increaſe ſuch tendency ſhould be ſtudiouſly avoided; and, on this account, the adminiſtration of the teſtacea in putrid, malignant fevers has of late been condemned by ſome ingenious writers. I was myſelf fully convinced of the rectitude of this opinion, and, in drawing up an account of the medicinal uſes of Magneſia, had therefore ſuggeſted the impropriety of preſcribing them where a bilious acrimony prevails. But not being able to recollect, that the ſeptic powers of Magneſia had ever been experimentally proved,*(a)* I thought it would be moſt ſatisfactory to determine them by that method; little doubting but that

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(a) I at that time overlooked an experiment of Dr. Macbride's which proves Magneſia to be ſeptic to *animal fleſh*; but having met with it juſt before theſe papers were going to the preſs, I take this method of acknowledging it.

that the event would juſtify my doctrine. My inquiries evince the accuracy with which Sir John Pringle has made his experiments, but as I was induced to carry the inveſtigation of this ſubject further than he has proceeded, very different practical inferences, from thoſe I at firſt expected, may, perhaps, be deduced therefrom.

EXPERIMENT II.

Two drachms of freſh beef, two ſcruples of Magneſia, and two ounces of diſtilled water were mixed in one bottle; and in another the ſame quantity of beef with two ounces of diſtilled water only: the meat was cut ſmall, and the bottles were placed uncorked in a heat rather inferior to that of the human blood. In twenty four hours the beef in the mixture with Magneſia was become quite putrid. The ſtandard was perfectly ſweet, and remained for ſome days, before it acquired the true putrid fœtor.

Being thus convinced that Magneſia is poſſeſſed of the property of haſtening the putrefaction of animal fleſh, in common with the reſt of the abſorbent tribe, it was imagined, that it might be of ſome conſequence to practice, to determine how far it exceeded or was inferiour to the calcareous and teſtaceous earths as a ſeptic; and alſo whether calcination produced any difference in it, in this reſpect. In reciting the experiments, where I only mention *Magneſia*, I always would be underſtood to mean that powder in its uncalcined ſtate, the calcined ſhall conſtantly be diſtinguiſhed by that epithet. It alſo appeared to be a convenient opportunity of repeating the inquiry, how far the addition of the teſtacea might take effect in diminiſhing the antiſeptic qualities of the contrayerva root.

EXPERIMENT III.

Into one phial were put two ſcruples of Magneſia, into a ſecond the ſame weight of calcined Magneſia, and into three others the ſame quantity of chalk, *pulv. e chel. cancr. comp.* and *pulv. contrayerv. comp.* To each of theſe, two drachms of freſh beef, and two ounces of diſtilled water were added. A ſixth phial was kept as a ſtandard, and contained only the ſame proportions of beef and water. The bottles, diſtinguiſhed in the order they are mentioned by the numbers 1, 2, 3, 4, 5, and 6, were placed in the ſame heat as that to which the Magneſia was expoſed in the former experiment, and were frequently ſhaken up and examined.

In twelve hours, number 1 began to ſmell; an inteſtine motion was perceptible in numbers 3, 4, 5, and 6, but eſpecially in the chalk. In twenty four hours, number 1 was become highly putrid, number 3 ſmelled offenſively, number 4 had acquired a very ſlight fœtor, as had number 5 which fermented briſkly. The ſtandard had acquired a vinous ſmell, but number 2 remained unchanged.

In thirty ſix hours, number 3 was very putrid, numbers 4 and 5 had made little progreſs ſince the laſt examination, though number 5 was rather more putrid than the other, allowance being made for the peculiar odour of the contrayerva; but in four hours more they both ſtunk intolerably. The ſtandard continued two or three days longer before it became abſolutely putrid, and the calcined Magneſia preſerved the beef untainted for ſeveral days longer, when it was removed to make room for other phials. The water which was mixed with the calcined Magneſia differed from all the others in not becoming bloody, nor did the beef in it ſeem ſo tender as when infuſed in lime water.

When I made the firſt experiment, I had not obſerved any diſcharge of air from the Magneſia and beef, and in the preſent one no fermentation was perceptible either in number 1 or 2. As this was an unexpected circumſtance in the former, I repeated the experiment ſeveral times, but the event was always the ſame.

Magneſia was afterwards compared with crab's eyes, burnt hartſhorn, and prepared coral. The mixture with Magneſia grew putrid firſt, afterwards that with the crab's eyes; the other two remained for ſome hours longer before the putrid fœtor came on.

From the above experiments it appears that Magneſia Alba, when replete with fixed air, is a ſtronger ſeptic to animal fleſh than any other abſorbent which was compared with it; and yet when deprived of its air by calcination, it powerfully reſiſts putrefaction.

Dr.

Dr. Macbride has endeavoured to account for this difference between calcareous earths and quick-lime, by ſuppoſing the particles of the lime to inſinuate themſelves intimately into the texture of the beef, and to prevent the eſcape of the fixed air, by attracting, abſorbing, and thus confining it within the ſubſtance of the beef. How far this theory is ſatisfactory is not my province to determine; and the matter is ſo obſcure, that I do not preſume to offer any conjecture of my own, relative to the reaſon of it.

Nitre is found to be a ſtrong antiſeptic when applied to animal fleſh, but to reſiſt the putrefaction of bile with a very diſproportionate force: and Dr. Percival has lately obſerved the ſame difference in the action of the Columbo root.

Theſe variations encouraged me to try the effect of Magneſia on gall; but being ſtrongly prepoſſeſſed with the notion of its ſeptic quality, I entertained very ſmall hopes of a different event. I was alſo deſirous to compare the action of the calcined Magneſia with the other. The heat uſed in the ſucceeding experiments was the ſame as that in the preceding trials.

EXPERIMENT IV.

To two drachms of freſh ox gall, were added two ſcruples of Magneſia, and two ounces of water, in one phial. Two ſcruples of calcined Magneſia with the ſame quantity of gall and water were placed in another; and a third containing two drachms of bile without any other addition than water, ſerved as a ſtandard, which began to have a rank ſmell in forty-eight hours, and in ſixty hours was highly offenſive. The calcined Magneſia and bile emitted a ſweetiſh ſmell, ſomething reſembling that of the urine in a diabetes: the liquor which ſwam above was quite pellucid and colourleſs, whereas that of the other Magneſia was turbid and tinged green with the bile. Both were perfectly free from any putrid fœtor; the latter continued ſo for ten days, and the bile with the calcined Magneſia remained unchanged as long as any notice was taken of it.

EXPERIMENT V.

Twenty grains of Magneſia

preſerved ſix drachms of ox's gall free from any ſigns of corruption for twenty-four hours after the ſtandard containing gall and water, of each ſix drachms, had become putrid. A ſcruple of the calcined Magneſia mixed with the ſame proportions of gall and water, remained without any alteration as long as they were attended to, which was about ten days.

EXPERIMENT VI.

The putrid liquor which had been uſed as a ſtandard in the fourth experiment, was divided into four parts, one of which was continued as a ſtandard, to another was added about half a drachm of Magneſia, and an efferveſcence was procured by ſome drops of oil of vitriol. The offenſive ſmell continued for a few minutes, but was ſoon much abated, and at length entirely ſweetened. To another portion was added twenty grains of Magneſia only, this in fifteen minutes had almoſt loſt its putrid ſmell, and in two or three hours became quite ſweet. To the fourth was added the ſame weight of calcined Magneſia, which almoſt inſtantly deprived the liquor of every degree of putridity. The ſtandard was then mixed with a ſcruple of crab's eyes, which, for about a minute, ſeemed to diminiſh the fœtor, but it then returned as ſtrongly as ever; whereas the others continued ſweet for ſeveral days.

EXPERIMENT VII.

Two drachms of putrid bile,

which had been kept cloſely corked in a phial ſince the year 1770, and ſmelled very offenſively, were mixed in a cup with twenty grains of Magneſia, and half an ounce of water, and thereby reſtored to ſweetneſs. Twenty grains of calcined Magneſia were alſo added to two drachms of the ſame bile: on ſtirring them a pungent ſmell was obſerved, like that of volatile ſalts, and half an ounce of water being put to the mixture, the bile was totally deprived of any putrid ſmell. Even five grains of the ſame powder ſweetened two drachms of putrid gall.

EXPERIMENT VIII.

Magneſia, calcined Magneſia, chalk, crab's eyes, *pulv. e chel. cancr. c.* and *pulv. contrayerv. comp.*

comp. each in the proportion of two ſcruples to two drachms of ox gall and two ounces of water, were expoſed to the uſual warmth. The crab's eyes mixture grew rank in twenty-four hours, and in forty-eight was abſolutely putrid: the bile with the chalk was in the ſame condition in twelve hours more. The Magneſia mixture became putrid on the ninth day; the *pulvis e chel.*(b) on the tenth; but the *pulvis contrayerv. comp.* preſerved the bile from corruption about three weeks, and no change was perceptible in that with the calcined Magneſia when examined above a month after their firſt admixture.

(b) Doctor Macbride found that *pulv. e chel. c. c.* haſtened the corruption of bile: might not this depend on ſome variety in the compoſition of that powder? Chalk and oyſter ſhells are often ſubſtituted in the hoſpitals and by the druggiſts, for the other ingredients.

EXPERIMENT IX.

Twenty grains of Magneſia, and the ſame quantity of chalk, were ſeparately neutralized with diſtilled vinegar, and their effects on ox gall compared with that of thirty grains of the artificial Epſom ſalt diſſolved in a ſufficient quantity of water. The bile in this ſolution became putrid in about ſixty hours. That in the ſolutions made in the vegetable acid retained its ſweetneſs for ſeveral days longer.

Theſe experiments, which terminated ſo very differently from what I had expected, ſeem to juſtify, in ſome degree, the practice of giving the teſtaceous and abſorbent medicines in fevers of a putreſcent type, at the ſame time that they point out ſome of that claſs which ought to be avoided, and evince how fallacious a method it is to judge of the effects of medicines *a priori*.

As the bile is, by many, ſuppoſed to be the great ſource of putrid diſeaſes, ought not the antiſeptics which may be preſcribed in theſe caſes, to be ſuch as more particularly impede the corruption of this fluid, rather than that of fleſh ?

On account of the ſuperiour antiſepticity of the calcined Magneſia to moſt of the abſorbents, and its greater purity and ſolubility, together with the probability of its acting as an evacuant, as well as a corrector of putrid bile, does it not appear to merit a preference to all other medicines of this claſs?

In diſeaſes where an acid cacochymy prevails, and an alkaleſcent diet, ſuch as wild fowl, fiſh, &c. is preſcribed, but from the ſcarcity of theſe articles in ſome countries, cannot be complied with; may not taking Magneſia or the teſtaceous powders, immediately before or after meal time, coincide with this intention, by increaſing the putrefactive fermentation of other animal food in the ſtomach, which in theſe diſorders is almoſt totally ſubdued by the ſuperabundant acid?

But where animal food is uſed in putreſcent diſeaſes, either through neceſſity, or the obſtinacy of the patient, ought not Magneſia, in an uncalcined ſtate, and all the calcareous and teſtaceous earths to be carefully abſtained from?

Dr. Percival, in a volume of very ingenious experiments and obſervations which have been before referred to, has mentioned a phyſician of his acquaintance, who always obſerved his ſtools to be more particularly offenſive after having taken Magneſia. Might not this proceed from the action of the Magneſia on the animal food he had eaten; and is it not reaſonable to ſuppoſe that the effect might have been very different where a vegetable or milk diet had been uſed, as is generally the caſe in putrid fevers, and in young children?

I know a perſon whoſe ſtools are, in common, very little tinged with bile, who after taking calcined Magneſia, evacuates fæces of a very bilious appearance, though leſs fœtid than uſual. It is a fact worthy of obſervation, that in the experiments which were made with calcined Magneſia and bile, the latter was abſorbed by, and had united with the former; and another remarkable circumſtance was, that the watery part of all the mixtures which reſiſted putrefaction, acquired a very pungent, ſaline taſte.

CHAP. VII.

ON THE SOLVENT QUALITIES OF CALCINED MAGNESIA.

DR. Macbride, whoſe experimental reſearches have very juſtly acquired him a high degree of reputation in the philoſophical world, ſuppoſes fixed air to be the combining principle of bodies, and has applied this ingenious theory to pharmaceutical improvements. He diſcovered that lime triturated with reſinous gums, promotes their diſſolution in water; which, he thinks, is thus enabled to take up the ſame parts of theſe ſubſtances, as are ſoluble in ſpirit of wine. Theſe aqueous tinctures are tranſparent, not milky like the ſolutions made with yolk of egg, or gum arabic; but the lime communicates a highly diſagreeable taſte to them, and the action of lime water, which he uſed in ſome inſtances, is not ſufficiently powerful to extract ſtrong tinctures from theſe bodies. As calcined Magneſia has a great affinity with fixed air, I was deſirous of trying whether it would contribute to render reſinous ſubſtances ſoluble in water; for being itſelf inſoluble, the ſolutions would conſequently be free from any other impregnation than that of the reſins.

EXPERIMENT X.

Five grains of camphor were rubbed for five minutes with an equal quantity of calcined Magneſia: after the camphor was reduced to powder, it united into a hard concrete with the Magneſia, but immediately diſſolved on the addition of a ſmall quantity of diſtilled water, of which an ounce was mixed with them, and immediately paſſed through filtering paper. The filtrated liquor was highly impregnated with the camphor.

EXPERIMENT XI.

Five grains of opium triturated in the ſame manner, yielded a tranſparent tincture, of as deep a colour as the tinctura Thebaica of the London Diſpenſatory, and taſting ſtrongly of the opium.

EXPERIMENT XII.

Gum guaiacum and calcined Magneſia, of each a ſcruple, being rubbed with an ounce of water, and filtered, gave an elegant tincture, quite tranſparent, and poſſeſſing, in a conſiderable degree, the taſte of the gum.

Gum galbanum, ſtorax, maſtick, myrrh, aſſafætida, ſcammony and balſam of Tolu, being ſeverally triturated with equal weights of calcined Magneſia, diluted with water and filtered, afforded neat tinctures, ſtrongly impregnated with the different drugs.

EXPERIMENT XIII.

In order to determine the quantity of opium thus diſſolved, half an ounce of crude opium, the ſame quantity of calcined Magneſia, and eight ounces of diſtilled water were rubbed for a quarter of an hour in a glaſs mortar, and having ſtood to infuſe during two hours, the liquor was ſeparated through paper. The tincture was of a darker colour than that before deſcribed, and was reduced by a gentle heat to a pilular conſiſtence. This extract weighed ſixty-eight grains, which, allowing for impurities, for what would be diſſipated in evaporation, and for the air probably abſorbed by the Magneſia, is a large proportion to be ſo ſoon diſſolved. The reſiduum which was left in the filter was dried, and weighed ſix drachms.

EXPERIMENT XIV.

A drachm of Peruvian bark, twenty grains of calcined Magneſia, and four ounces of diſtilled water being rubbed together during fifteen minutes, the filtered infuſion reſembled in appearance the ſimple tincture of bark, and had an intenſely bitter taſte, but was not ſtrongly impregnated with the peculiar aroma of the bark.

Thus then we have an eaſy and very elegant method of preparing aqueous tinctures from the gum reſins, and adminiſtering them in a more convenient form and in

larger

larger doſes than could be done when diſſolved in a ſpirituous menſtruum; and much more agreeably than in the half-diſſolved ſtate to which they are reduced by the aid of egg or gum arabic. The Magneſia does not impart any thing to them, whereas the lime will ſeldom be ſo ſaturated with air but that ſome part of it will remain ſoluble in the water: and as they may be given diluted to whatever degree the preſcriber chuſes, conſiderable advantages may be expected therefrom, it being probable that they will be better enabled to pervade the very ſmall veſſels; and the heating properties of the balſams be more effectually obviated than by any other mode of preparation.

Indeed, tinctures prepared by the above method, are not calculated for officinal compoſitions, but for extemporaneous preſcription; as moſt of them, except camphor, depoſite a ſediment when they have been kept a week or two.

CHAP. VIII.

ON THE VARIOUS SOLVENT POWERS OF QUICK-LIME IN DIFFERENT QUANTITIES.

THE difficulty of ſolution in the vegetable aſtringents has been complained of by various writers on the *Materia Medica.* Water and alcohol are the menſtrua in uſe; but great quantities of each are neceſſary to procure even a ſlight impregnation, and much heat and long boiling are ſaid actually to deſtroy the aſtringent quality, and vegetable texture. *(a)* As a menſtruum capable of diſſolving them with greater facility appeared to be a deſideratum, not only in pharmacy, but in other arts, particularly in that of dying blacks, I reſolved to try Dr. Macbride's method of increaſing the ſolvent power of water, by means of quick-lime. But as I was aware that the quantity of lime he made uſe of in obtaining an aqueous tincture of Peruvian bark, would be too great for the dyer's uſe, I wiſhed to uſe only ſuch a quantity as would be ſufficiently ſaturated with the air contained in the vegetable, to be itſelf precipitated; and to compare the tinctures thus made, with

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(a) Vid. Lectures on the Materia Medica, as delivered by William Cullen, M.D. p. 195.

with a ſtandard prepared with ſimple water.

EXPERIMENT XV.

I rubbed three drachms of Aleppo galls reduced to powder, with four ounces of filtered rain water, for fifteen minutes, and then paſſed the ſolution through paper. It was very ſtyptic to the taſte, and was nearly of the ſame colour as Huxham's tincture of bark. The reſiduum in the filter was unchanged in colour. The bottle containing the liquor was marked number 1.

EXPERIMENT XVI.

Three drachms of the ſame

galls, and two ſcruples of quicklime, were triturated with four ounces of rain water, as in the laſt experiment. The filtered liquor had ſcarcely any aſtringency to the taſte, and was of a very pale colour. The reſiduum was of a deep purple. Marked number 2.

EXPERIMENT XVII.

The ſame quantity of galls as in the two former experiments, after triture in the ſame degree with four ounces of lime-water, was ſeparated by filtering through paper. The tincture thus obtained was highly aſtringent to the palate, of a deep chocolate colour, and the reſiduum was of a lighter brown than number 1. Marked number 3.

EXPERIMENT XVIII.

To each of the above tinctures were added forty drops of a ſtrong ſolution of ſal martis. Number 1 became very black. Number 2 changed colour but little, and on ſtanding precipitated a brown ſediment, which, the ſuperiour part of the liquor being decanted off, became again tranſparent on the addition of a few drops of the vitriolic acid. Number 3 appeared to ſtrike a deeper black than number 1; and theſe being tried as inks, number 3 ſeemed to have the ſuperiority; but a ſlip of linen cloth being macerated in each for ſome hours, that in number 1 had taken a more perfect black than the ſlip number 3. No trial was made with cotton or woollen, which it is probable would have differed from the linen.

EXPERIMENT XIX.

Oak bark was uſed inſtead of galls, with ſimilar ſucceſs, except that the infuſion made with lime-water was not ſo deep in colour as that with ſimple rain water, though much deeper than that prepared with quick-lime.

EXPERIMENT XX.

Peruvian bark, quick-lime, and

lime water, in the ſame proportion as directed by Dr. Macbride, were rubbed together. The filtered infuſion had little colour, taſted very ſlightly of the bark, though ſtrongly of the lime, and on my blowing in a ſtream of air from my lungs, the ſurface of it was immediately covered with a cremor calcis, the liquor grew turbid, and depoſited a copious ſediment.

EXPERIMENT XXI.

The ſame quantity of Peruvian bark, and of lime water, without the addition of any freſh lime, being rubbed in the ſame manner, afforded a tincture taſting ſtrongly of the bark, nearly of the ſame colour as the ſimple tincture obtained by proof ſpirit, and retaining its tranſparency when blown into. This tincture was much more ſtrongly impregnated than one made by triture with common rain water only. And by this proceſs, allowing a few hours for maceration, an infuſion is prepared, greatly ſuperiour in ſtrength to any decoction, infuſion, or tincture of bark I ever ſaw.

From the reſult of theſe experiments I ſuſpect, that by uſing a greater quantity of lime in the ſixteenth and twentieth experiments than the vegetable could ſaturate with fixed air, the water became ſo impregnated with lime as to be more unfit to act on the vegetable. From the purple colour of the reſiduum of number 2, it was evident that the galls were decompounded, but the water was not capable of diſſolving and ſuſpending the particles. Dr. Percival *(b)* mentions his having unſucceſsfully repeated Dr. Macbride's experiment with bark and quick-lime. To what then can this difference be owing? Perhaps it may be accounted for thus: It ſeems probable that the lime uſed by Dr. Macbride, not being freſh calcined, had recovered part of its air; for he ſays, "It will no doubt be reckoned ſuperfluous, that lime water is ordered to be added to theſe ſeveral ſubſtances, when they are alſo to be rubbed along with quick-lime; but the reaſon is this. *If the lime were ſo quick and freſh as to raiſe heat when*

(b) Percival's Eſſays Medical and Experimental, 2d Edit. p. 65.

when common water is poured on it, the ſolution might then be made without the aid of lime water; but, as it will for the moſt part happen, that the lime kept in the ſhops will not be perfectly freſh, it will be beſt that the preſcriber ſhould direct lime water to be uſed." On the contrary, Dr. Percival uſed *lime freſh from the kiln.* Theſe circumſtances, if my theory be juſt, would greatly vary the event of the experiment; and the trials I have here recited ſeem to prove, that ſo great a quantity of lime, and even a much ſmaller than is directed by Dr. Macbride, if freſh, inſtead of increaſing, diminiſhes the ſolvent power of water on aſtringent vegetables.

But as different drugs yield their virtues with more eaſe, and in greater quantity to ſome menſtrua

ſtrua than to others, it ſeemed probable, that even a very ſmall quantity of lime might render water leſs ſolvent of particular vegetables, than it is in its pure ſtate, though with others as large or perhaps a greater quantity than what I had uſed might be neceſſary: and as the determination of this point might be of ſome uſe in pharmacy, the following experiments were made; in the relation of which I ſhall make uſe of numbers as before, viz. the vegetable rubbed with four ounces of diſtilled water will be diſtinguiſhed by number 1, that with two ſcruples of lime and four ounces of lime water, number 2, and that with lime water only, number 3.

EXPERIMENT XXII.

Two drachms of ſnake root were rubbed for fifteen minutes with the above-mentioned different proportions of diſtilled water, quick-lime and lime water, and lime water alone.

Number 1 was a dark brown tincture, taſting ſtrongly of the ſerpentaria.

Number 2, ſtraw coloured, taſte of the lime diſagreeable, that of the root not diſtinguiſhable.

Number 3, amber coloured, taſtes of the root.

EXPERIMENT XXIII.

Two drachms of Columbo being triturated in the ſame manner,

Number 1, dark brown tincture; taſtes much of the Columbo.

Number 2, yellow; faint taſte of the Columbo, but that of the lime very diſagreeably prevalent.

Number 3, colour as number 1; but taſtes more highly of the Columbo.

EXPERIMENT XXIV.

Two drachms of contrayerva root with the ſame treatment yielded in the following proportions:

Number 1 gave a pale brown tincture, taſting of the contrayerva.

Number 2, bright amber colour; taſte of the lime ſo ſtrong as to admit of no other.

Number 3 exceeded number 1 both in colour and taſte.

EXPERIMENT XXV.

Jalap being triturated in the ſame proportions,

Number 1 dark brown; taſte of the jalap ſtrong.

Number 2 pale yellow; taſte of the lime predominant, though that of the jalap perceptible.

Number 3, colour not quite ſo high as number 1, but equal in taſte.

EXPERIMENT XXVI.

The reſult of the ſame trial with ipecacuanha was, that number 1 was of a light brown colour, taſting highly of the ipecacuanha.

Number 2 was of a deep yellow, having the ſame diſagreeable taſte of the lime complained of in the other tinctures, but that of the ipecacuanha ſcarcely perceptible.

Number 3 produced a tincture of the colour of red port wine, ſtrongly flavoured with the ipecacuanha, though it had not ſo much of the diſtinguiſhing ſharpneſs of that root as number 1.

EXPERIMENT XXVII.

The different tinctures of rhubarb, prepared in the ſame manner as above, had the following appearances:

Number 1 brown, with a yellowiſh tinge, ſtrongly impregnated with the taſte of the rhubarb.

Number 2 deep yellow, taſte of the lime as in the other tinctures prepared with it.

Number 3 crimſon; taſte of the rhubarb ſtrong, but unequal to number 1.

None of the tinctures prepared with lime water grew turbid from a ſtream of fixed air being conveyed into them.

Hence it appears that the triture of quick-lime with all the above roots did not in the leaſt degree promote, but rather impede their ſolution in water; that lime water extracts the ſoluble parts of many, and eſpecially their colouring principles, more powerfully than diſtilled water; but that this is by no means always the caſe, as in three inſtances out of ſix, the tinctures prepared with diſtilled water exceeded thoſe with lime water in taſte, and in two inſtances were ſuperiour, and in one equal in colour.

CHAP. IX.

ON THE COMPARATIVE ANTISEPTIC POWERS OF VEGETABLE INFUSIONS PREPARED WITH LIME, &c.

SIR JOHN PRINGLE, in the Appendix to his excellent Obſervations on the Diſeaſes of the Army, allows lime water to poſſeſs but a ſlight antiſeptic quality. Doctor Macbride on the contrary aſſerts, that it has great power in reſiſting putrefaction, but at the ſame time acknowledges that it deſtroys the coheſion of the conſtituent particles of animal ſubſtances, and therefore cannot be called a *true* antiſeptic, as it abſorbs the fixable air from them, and only preſerves them ſweet by confining it within their texture, into which the lime is enabled to inſinuate itſelf in this diſſolved ſtate. As even this effect, if poſſeſſed by the tinctures of the antiſeptic vegetables prepared with lime or its water, would be an objection to their adminiſtration in putrid diſeaſes, I reſolved to determine by experiment, how far their antiſeptic powers were increaſed or diminiſhed by this mode of preparation: and I thought it probable, as thoſe prepared with the latter contain no lime when filtered, and yet in the extraction of the tinctures the vegetables are deprived of, at leaſt, a part of their air, they might be rendered leſs able to reſiſt putrefaction than either the infuſions prepared with diſtilled water, or thoſe with the addition of quick-lime. How far this reaſoning was juſt, the reſult will diſcover.

EXPERIMENT XXVIII.

Pieces of beef, each weighing about two drachms, were ſeparately infuſed in the different tinctures of Peruvian bark, ſnake root, Columbo, and contrayerva, prepared with lime, lime water, and diſtilled water, as in the preceding experiments; and the bottles containing them were expoſed for two days to a degree of heat equal to that of the human blood. They were afterwards ſuffered to remain without any artificial heat, the temperature of the air being warm. The tincture of Columbo prepared with quick-lime was the only one not tried, the bottle containing it having been broken.

After thirty-ſix hours infuſion they were all ſweet, except the infuſion of Columbo in diſtilled water, which began to emit a diſagreeable, though not putrid fœtor. The beef in it, and in the tincture of the ſame root in lime water, was ſwelled, and whiter than before infuſion. That in the tincture of bark prepared with quick-lime, had its texture greatly deſtroyed, was of a chocolate colour, but ſweet. That in aqua calcis, the ſame in colour, ſhrivelled, firm, and ſweet. The pieces of beef in the tinctures of ſnake root and of contrayerva with quick-lime, had more the appearance of calf's lights than of beef, were quite ſpongy, but had acquired no putrid ſmell. Thoſe in the lime and diſtilled water, firm, and ſhewing no ſigns of putreſcency.

On the fifth day the infuſion of Columbo in lime water was very offenſive, though the beef when taken out of it was not putrid. That of the ſame root with diſtilled water had made no further progreſs. The tincture of ſnake root in diſtilled water was grown turbid, and had loſt colour, which it ſeemed to have imparted to the beef. This and all the others continued ſweet.

On the tenth day the beef in the diſtilled water and Columbo, as on the fifth. That in the lime water and Columbo, putrid.

The contrayerva infuſion in diſtilled water had acquired a diſagreeable fœtor, but the beef was not yet putrid. That with lime water and that with quick-lime ſtill ſweet.

The infuſion of bark with diſtilled water ſmelled rather muſty; the beef in it ſweet. The two infuſions of the ſame with lime and lime water ſhewed no further change.

The tincture of ſnake root in diſtilled water had a ſcum on the ſurface; beef not putrid. The other two tinctures of the ſame root unchanged.

On the eleventh day, the beef in the infuſions of Columbo and of contrayerva in diſtilled water beginning to putrefy, and

On the fourteenth day, both entirely putrid. The infuſion of bark in diſtilled water mouldy, but the beef ſweet.

The beef in the ſnake root and diſtilled water, putrid on the ſixteenth day; and the infuſion of contrayerva with lime water beginning to be offenſive, but the beef in it not yet putrid; but

On the nineteenth it was quite putrefied. The ſnake root infuſion in lime water, mouldy on its ſurface; no change in the beef; but this likewiſe became putrid in a few days more.

The remaining tinctures, viz. thoſe of the bark, ſnake root, and contrayerva with quick-lime, and that of the bark with lime water, remained above five weeks without any further change. Some time after, the beef in the ſnake root became ſeptic. The other three were unaltered at the end of ſix weeks from their firſt immerſion; and though the infuſion of bark in diſtilled water was very mouldy, the beef in it was free from any putrid fœtor. But it ſhould be obſerved that all the tinctures in the preparation of which quick-lime had been added to the lime water, had a peculiar odour during the whole time, from which the others were exempt.

From this experiment we may conclude that lime water, when uſed in ſuch a quantity in extracting the virtues of vegetables, as not to be ſaturated with the fixed air it receives from them, *ſtrongly* counteracts putrefaction, though it at the ſame time deſtroys the texture of animal bodies expoſed to its action. But when employed for the ſame purpoſes, in ſuch proportion as to be fully ſaturated with air; it abſtracts nothing from, but rather increaſes the antiſeptic power of the vegetable; nor does animal fleſh immerſed in tinctures thus prepared, ſuffer any diminution in the coheſion of its fibres.

CHAP. X.

ON THE SWEETENING PROPERTIES OF FIXED AIR.

THE very curious fact, that fixed air not only preſerves bodies from becoming ſeptic, but is alſo poſſeſſed of the power of reſtoring ſweetneſs to them when actually putrid, ſeemed to be eſtabliſhed by a number of very accurate experiments adduced in ſupport of the doctrine by its ingenious author. This has, however,

ever, lately been controverted by a learned writer, who has favoured the public with *an Experimental Inquiry concerning the cauſes which have been generally ſaid to produce putrid diſeaſes*, in which he has recounted ſeveral experiments, in direct contradiction to thoſe of Dr. Macbride. The authorities of both theſe gentlemen deſerve conſiderable attention, and it might ſeem preſumption in me to attempt to decide between them, had I only my own opinion to adduce; but as the accuracy of the following trials was witneſſed by a Phyſician, well known for his medical and philoſophical writings, I feel the leſs diffidence in ſubmitting them to the public. They were made with a view, only, to my own information, having in one of the former chapters recommended Magneſia to be taken in the act of effervefcence with an acid, as a corrector and evacuant of putrid bile; but as the event appeared to be ſo ſatisfactory, and as a determination of this point is the more important, from the late introduction of fixed air as an article of the materia medica, I hope I ſhall not be deemed to have impertinently obtruded into the diſpute by relating them, and endeavouring to point out what, probably, has been the cauſe of Dr. Alexander's drawing concluſions, ſo contrary to thoſe of the other celebrated experimentaliſt.

In the experiments which Dr. Alexander has related in ſupport of his opinion, he has made uſe of the following methods. He included pieces of putrid mutton in bladders, one containing *four ounces in meaſure* of fixed air from fermenting wort; another the ſame quantity from wort with a piece of putrid mutton in it; and the third, only *about half the quantity* from a mixture of bread, water, and ſaliva. In another experiment, he expoſed a ſlice of beef that had juſt begun to have the putrid ſmell, to a ſtream of air brought over from an efferveſcing mixture of diſtilled vinegar and ſalt of wormwood. In a third, the putrid fleſh was ſuſpended in the neck of a wide mouthed bottle, while *four ounces* of diſtilled vinegar were made into *ſpirit. minderer*. In a fourth, *four ounces* of air from bottled ſmall beer were confined twenty-four hours with the putrid ſubſtance, which in a fifth experiment was put into the neck of a bottle of ſmall beer, while it fermented before the fire for half an hour. In a ſixth, the ſeptic body was included in a bottle with *eight ounces* of air from an effervеſcing mixture of common vinegar and ſalt of hartſhorn. In one only, out of all theſe experiments, he found the beef in any-wiſe ſweetened, and even in that ſingle inſtance, though he at firſt thought the piece a little changed, yet when waſhed it recovered its putrid ſmell. However he confeſſes, that by bringing over fixed air from ſeveral other fermenting and effervеſcing mixtures, on pieces of meat juſt beginning to putrefy, they were rendered a little ſweeter, though never to ſuch a degree, as intirely to loſe their putrid taint.

So very different an account of ſo intereſting a ſubject was truly mortifying: The old adage, *experientia fallax, judicium difficile,* ſeemed to be too applicable to the preſent occaſion. Some caſes, in which fixed air uſed medicinally as an antiſeptic, appeared to have produced good effects, had occurred to ſome of my medical friends(*a*), and I even flattered myſelf that I had directed it to good purpoſe in an inſtance or two. But if the theory on which this practice was founded ſhould be falſe, the whole ſuperſtructure ſeemed likely to be deſtroyed. On reviſing Dr. Alexander's

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(*a*) See Dr. Percival's Experiments and Obſervations, p. 72; Dr. Prieſtley's papers on factitious air; and Mr. White's Treatiſe on the Management of Pregnant and Lying-in Women, p. 203.

ander's book, I imagined that I had diſcovered ſome thing in the conducting of his experiments, which might account for their terminating ſo differently from thoſe of Dr. Macbride.

The largeſt quantity of fixed air which Dr. Alexander made uſe of in any of theſe experiments was *eight ounces in meaſure*, and in one inſtance, only two ounces were employed to ſweeten the putrid ſubſtance. In that where the meat was ſuſpended in a wide mouthed bottle while the vinegar was made into *ſpirit. minderer*. no method ſeems to have been taken to retard the too rapid flight of the fixed air, which, from the quick diſſolution of the ſalt, would be ſoon diſſipated. From hence I ſuſpected, that a larger atmoſphere, or a longer continued ſtream of fixed air might be requiſite to reſtore ſeptic bodies to perfect ſweetneſs; and in order to decide this point, the following experiments were inſtituted, having previouſly obtained ſome ſlices of beef ſo exceedingly putrefied as to render the fœtor of them ſcarcely tolerable.

EXPERIMENT XXIX.

A bottle capable of containing three pints was filled with water, and inverted into a baſon of the ſame; a tube which communicated with another bottle, in which was an effervеſcing mixture of chalk and oil of vitriol, was then introduced into the mouth of the former, and a ſtream of fixed air continued, till the whole of the water was driven out by it. A piece of the above-mentioned putrid beef, faſtened by a ſtring to a cork, was conveyed into the bottle, which was corked before it was taken out of the water. The beef, after having been ſuſpended in this atmoſphere of fixed air for thirteen hours, was very conſiderably, though not entirely ſweetened. *But the air in the bottle ſeemed to have acquired all the putrid ſmell of which the fleſh had been deprived.* Another ſlice of the ſame beef was not at all ſweetened by expoſure, during the ſame time, to the open air.

EXPERIMENT XXX.

A piece of this beef ſuſpended

all night in the neck of a bottle of artificial Pyrmont water*(b)*, was rendered leſs putrid, though not near ſo much altered as that in the foregoing experiment. The water was ſtrongly impregnated with the putrid effluvia.

EXPERIMENT XXXI.

Two drachms of Magneſia Alba diluted with two ounces of water were placed in a quart bottle, to which was added a ſufficient quantity of the ſtrong ſpirit of vitriol to let looſe all the fixed air from the Magneſia, during the ſeparation of which, another equally putrid

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(b) See Dr. Prieſtley's Directions for impregnating Water with fixed Air.

trid piece of beef was ſuſpended in the bottle, which was ſo corked as to retard, though not totally prevent the eſcape of the air. Another piece of the ſame beef, was expoſed in like manner to the vapour ariſing from the addition of oil of vitriol to two drachms of chalk diluted with water. They were ſuffered to remain for twenty two minutes, and being then examined were abſolutely free from any putrid fœtor, and though well waſhed in water continued quite ſweet.

EXPERIMENT XXXII.

Air expelled from Magneſia by the nitrous acid, ſweetened a piece of the ſame putrid fleſh ſuſpended in the neck of the bottle during the effervefcence. The beef ſmelled of the nitrous acid, but remained equally ſweet when waſhed from it in water. Very little change was produced in another piece expoſed to the ſmoaking ſpirit of nitre.

It may be ſome additional evidence in ſupport of the ſweetening properties of fixed air, to declare that the highly offenſive, ſanious diſcharge of a cancer has been rendered conſiderably ſweeter by it *(c)*; and that I have ſeen a caſe of a dyſenteric fever, attended with extremely fœtid and bloody ſtools, in which fixed air was directed, by the Phyſician who attended, to be thrown into the inteſtinal

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(c) Directions for impregnating Water with Fixed Air, by Joſeph Prieſtley, L.L.D. F.R.S.

teſtinal tube by way of clyſter; the conſequences of which were the correction of the putrid ſmell, of the diſcharges, and the reduction of the inflation of the abdomen, together with contributing conſiderably to the eaſe of the patient after each injection of air *(d)*. A third caſe of this kind has very lately occurred to Dr. Percival, in which the injection of fixed air removed the fœtor of the ſtools, and the patient recovered without the aſſiſtance of any other medicine, except the moderate uſe of wine as a cordial, and of a decoction of Peruvian bark during the convaleſcent ſtate. I have alſo experienced the removal of a very

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(d) This caſe, together with another ſimilar to it, will probably appear more fully in the next volume of the Philoſophical Tranſactions, with Dr. Prieſtley's papers on factitious air.

very large and deep ſlough, and the healing of the ulcer in the putrid ſore throat, more expeditiouſly by the inſpiration of fixed air than by any other method. *(e)*

One circumſtance in the twenty ninth experiment peculiarly attracted my attention, viz. that the air in the bottle was ſo very putrid, though the beef expoſed to it was reſtored to ſweetneſs. The ſeptic effluvium therefore did not appear to be deſtroyed, but to have changed place. From this fact it occurred to me that there might poſſibly be an affinity between the fixed air and the ſeptic particles, and that this air might

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(e) The patient in this laſt caſe being a lady in the country, at ſuch a diſtance that I could not frequently viſit her; by continuing to inſpire the fixed air, after the ulcer was cleanſed, and in a healing ſtate, brought on a conſiderable inflammation of the fauces.

might act as a menſtruum on the effluvia emitted by putrid bodies. I have ſince had the pleaſure to ſee that Dr. Prieſtley, whoſe inveſtigation into the nature of factitious air has lately been laid before the Royal Society, and muſt contribute to exalt him to a ſtill higher rank as a Philoſopher, has taken notice of ſomething ſimilar hereto. I am ſenſible that difficulties attend this theory. Doctor Percival, in the ſecond volume of his Eſſays, which is now in the preſs, has offered ſome ingenious conjectures on the ſubject, and to them I refer the reader. I ſhall only mention one experiment which ſeems to give ſome force to this doctrine.

EXPERIMENT XXXIII.

Slips of linen cloth dipped in very rancid oil, had their rancidity much diminiſhed by expoſure to a ſtream of fixed air from an efferveſcent mixture of chalk and ſpirit of vitriol. But a pint bottle of the ſame oil being ſaturated with this vapour, was equally offenſive as before the air was thrown into it, though the oil appeared to abſorb a conſiderable quantity of air.

Dr. Macbride expoſed a piece of rag dipped in lixivium tartari, and another tinged blue by the ſcrapings of raddiſhes, to the vapour ariſing from a large vat of melaſſes waſh in high fermentation, without any change being effected in either, which could be ſuppoſed to proceed from an acid vapour. But as water impregnated with fixed air has evidently an acidulous taſte, and it ſeemed probable that ſome of the vitriolic acid might be volatilized during the effervefcence which proceeds from its admixture with the alkaline body, when the air is procured from theſe ſubſtances, it was apprehended that the antiſeptic and ſweetening powers of air thus obtained, might depend on the acid contained in it. In order to evince how far this conjecture was juſt, Doctor Percival was ſo obliging to aſſiſt me in ſuggeſting and making the following experiments.

EXPE-

EXPERIMENT XXXIV.

Twenty drops of ſyrup of violets mixed with a glaſs-full of water were changed into a lively red by the addition of one drop of dilute ſpirit of vitriol. The ſeaſon of the year did not allow us to uſe the freſh juices of vegetables, but this trial ſhews the genuineneſs of the ſyrup of violets, and that it was a ſufficiently delicate teſt of acidity.

EXPERIMENT XXXV.

A paper beſmeared with this ſyrup, was placed over a veſſel which contained an efferveſcing mixture of chalk and oil of vitriol.

triol. No change of colour took place except in one ſmall point *(f)*, which had probably been accidentally touched by the vitriolic acid.

EXPERIMENT XXXVI.

Twenty drops of the ſyrup of violets were added to a glaſs-full of water ſtrongly impregnated with fixed air, after the method directed by Dr. Prieſtley *(g)*, but without any variation in the colour of the violets.

(f) In making this experiment, if the vegetable juice be placed too near to the effervescing mixture, ſome particles of the acid will be forced up to it, together with the air, and may occaſion an erroneous concluſion to be drawn from it.

(g) Directions for impregnating water with fixed air, &c. by Joſeph Prieſtley, L.L.D.

EXPERIMENT XXXVII.

A few drachms of the ſyrup of violets were diſſolved in half a pint of water, which was afterwards impregnated with air from an effervеſcing mixture of chalk and the ſmoaking ſpirit of nitre; but the ſyrup of violets ſuffered no change of colour.

EXPERIMENT XXXVIII.

A piece of putrid fleſh which had been ſweetened by the vapours of iron filings and the nitrous acid, had a pungent, acidulous ſmell. It was carefully waſhed in water, and ſtill remained free from putridity. A few drops of lixivium tartari were inſtilled into this water without producing any ſenſible efferveſcence.

May we not infer from theſe experiments, that if fixed air be an acid, it is an extremely weak one, and not ſufficient, as ſuch, to ſweeten putrid bodies; which effect muſt conſequently be owing to ſome other mode of action, the principles of which are not as as yet poſitively defined?

CHAP. XI.

A REVIEW OF THE GENERAL CONCLUSIONS DEDUCIBLE FROM THE FOREGOING OBSERVATIONS AND EXPERIMENTS.

1. THE due preparation of MAGNESIA ALBA depends on the proper mixture of the alkaline lixivium with the ſolution of the ſal catharticus amarus; on the precipitated powder being immediately thrown into a

very large quantity of boiling water; on the purity of the water uſed in the proceſs; on the expeditious drying of the medicine, and on an exact attention to cleanlineſs.

2. The artificial Epſom ſalt, or *ſal catharticus amarus*, affords Magneſia, at leaſt, equally pure with that obtained from the Epſom waters; and as the writers *(a)* on mineral waters mention thoſe of Epſom to contain beſides their ſalt, a conſiderable quantity of unneutralized earth, which appears, from Dr. Rutty's experiments, to be calcareous, they ſhould ſeem peculiarly unfit for the purpoſe of preparing Magneſia. Some of the *Epſom Magneſia* being calcined, impregnated diſtilled

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(a) Allen, Lucas, Rutty, Monro, &c.

diſtilled water with a calcareous earth.

3. A ſufficiently ſtrong and well purified lixivium of potaſhes is equally adapted to procure the precipitation of Magneſia, as a ley made with ſalt of tartar, or any other fixed alkali.

4. MAGNESIA ALBA differs eſſentially in its chemical and medicinal properties from every other known abſorbent earth; and when mixed with an acid, either before or after its admiſſion into the ſtomach, is *purgative in a much ſmaller quantity* than chalk, crab's eyes, or any of the calcareous or teſtaceous earths.

5. The calcination of Magneſia diveſts it of thoſe diſagreeable

properties complained of by Hoffman, and other practitioners; the fixed air which conſtitutes ſo great a ſhare of its compoſition, and is the cauſe of the uneaſy ſenſation produced by this powder, being expelled in the proceſs. But depriving the Magneſia of its air does not render it cauſtic or unfit for internal uſes.

6. It is a common, but unchemical practice, to mix acid and alkaline ſubſtances in the ſame compoſition, without attending to the changes which will be produced in their nature by being united. Among other inſtances of this kind which might be pointed out, we often meet with lenitive electuary, cream of tartar and Magneſia Alba preſcribed together in one medicine, the

conſequence of which is, that the Magneſia is not only unintentionally neutralized, but the efferveſcence produced in it by the acid occaſions the electuary to ſwell and renders it unſightly, beſides altering the nature of the pulps and ſyrup which enter the compoſition, by inducing a vinous fermentation in them. The calcined Magneſia being a non-efferveſcent may be united with acids under this form without any other inconvenience than their producing a neutral ſalt, and the propriety of this change muſt depend on the intention of the preſcriber.

7. It appears that Magneſia Alba, though remarkably ſeptic to animal fleſh, retards the putrefaction of bile, and reſtores ſweetneſs to it when actually putrid:

trid: That theſe laſt effects are ſtill more ſtrongly produced by the calcined Magneſia, which alſo powerfully reſiſts the corruption of fleſh: That ſome of the other abſorbents prove antiſeptic to bile; and conſequently that the opinion of the univerſal ſeptic property of the abſorbent claſs of medicines, and of the impropriety of preſcribing them in bilious diſeaſes, may admit of ſome exceptions.

8. Magneſia, when calcined, has the ſame property as quick-lime of promoting the ſolution of reſinous gums in water.

9. The increaſed power of water as a menſtruum to vegetable aſtringents, depends on only ſuch a quantity of lime being employed as can be ſaturated with air by the

ſolvend; but if a larger proportion be uſed, the action of the water on the vegetable is rather prevented than promoted.

10. Though lime water in ſeveral inſtances appears to be a more powerful menſtruum to vegetables than diſtilled water; yet the latter is ſometimes preferable, and acts more efficaciouſly than when impregnated with lime.

11. Antiſeptic vegetables yield tinctures to lime water, which reſiſt putrefaction more powerfully than thoſe prepared from the ſame drugs with diſtilled water, without leſſening the coheſion of animal fibres.

12. Waters which contain a large quantity of calcareous earth,

either ſimply ſuſpended, or in a neutralized ſtate, are highly improper for pharmaceutical purpoſes in general, and eſpecially for the preparation of extracts, where much water and long continued boiling are requiſite.

13. The power of fixed air to reſtore ſweetneſs to putrid bodies, is, it is hoped, clearly eſtabliſhed: and there appears to be ſome degree of probability, that fixed air produces this effect by acting as a menſtruum to the putrid effluvia: It ſeems alſo to be proved, that its antiſeptic quality is not owing to any acidity which it carries off with it from the effervеſcing mixture.

THE END.

AN
APPENDIX
TO
Experiments and Obſervations
On the PREPARATION of
MAGNESIA, &c.

CONTAINING

Strictures on Mr. GLASS'S MAGNESIA.

By THOMAS HENRY, Apothecary.

Mancheſter, March 8, 1773.

IT is with the utmoſt reluctance I find myſelf indiſpenſibly obliged to addreſs the public on a ſubject, from the nature of which I may perhaps incur the ſuſpicion of acting from intereſted views: ſhould I be ſo unhappy, my friends who know me will, I truſt, do me the juſtice to acquit me of the charge of being influenced by any improper motives; and I ſhall hope for the candid indulgence of thoſe perſons to whom I am a ſtranger.

About a year and half ſince I tranſmitted to the College of Phyſicians an account of a method of preparing Magneſia Alba, equal to that which had been long ſold by Mr. Glaſs of Oxford, and which was generally and deſervedly eſteemed by others, as well as by myſelf, to be the ſtandard of purity. Though that gentleman carefully concealed the minutiæ on which the ſucceſs of his proceſs depended, he had always prepared it with the moſt laudable attention.

My proceſs was received by the College, and publiſhed in the ſecond volume of the Tranſactions of that truly reſpectable ſociety, and has ſince been reprinted in a pamphlet which I lately publiſhed, and in which, among other ſubjects, I have recommended Calcined Magneſia to the attention of the faculty, as a medicine of conſiderable importance.

Notwithſtanding I had been informed, by a relation of Mr. Glaſs, that he had diſpoſed of his name in the Magneſia buſineſs to ſome perſons, for a very valuable conſideration, yet I doubted not their adhering to the proper manner of preparing it; but as I have ſince had occaſion to change my opinion, and as the credit of the Calcined Magneſia depends ſo much on its purity before calcination, I am neceſſitated to take this method of informing the public of my reaſons for declaring that ſold under the name of Mr. Glaſs to be impure, calcareous, and improper for the purpoſe of calcining.

Two or three years had elapſed ſince I had ſeen any of Mr. Glaſs's Magneſia, except a ſmall quantity which I had preſerved, as a ſtandard for the levity of what I prepared myſelf. But having a mind to calcine ſome of his, in order to compare it with my own, I ſent for a box from Mr. Harrop, an agent of the proprietors in this town. I was ſurprized, on opening it, to find the Magneſia ſpecifically lighter, to an amazing degree, than any I had formerly ſeen, inſomuch that the ſix ſhillings box, which uſed to contain about four ounces, now only contained an ounce and half, Troy weight: *ſo that this medicine is ſold at the rate of two pounds eight ſhillings the Troy pound, which is not fourteen ounces Avoir-*

dupois. On attempting to diſſolve it in the vitriolic acid, I found the ſolution very imperfect; and on calcining half of the contents of the box, it was with indignation that I diſcovered this Magneſia, ſo extolled, ſo puffed in every newſpaper, for *it's ſuperior purity and goodneſs*, to contain no inconſiderable quantity of calcareous earth; for the pungency of it was very diſagreeable in the mouth, and one ſcruple of it impregnated an ounce of water almoſt as ſtrongly as ſo much lime would have done. Theſe are teſts, which, tho' much ſtronger than that of levity which the proprietors have artfully placed as the principal one, they have avoided mentioning, being ſenſible of its deficient ſolubility, and that it would not ſtand the FIERY ORDEAL.

Willing, however, to believe that this impurity might be accidental, though I had reaſon to think, from the artful conduct above alluded to, that it was not ſo, I ſent for a box of Magneſia, from the agent for the ſale of Mr. Glaſs's Magneſia at Preſton. This likewiſe proved calcareous, though I thought the lime, produced by calcining it, not quite ſo pungent as the other; it, however, made a ſtrong lime-water.

That I might avoid drawing too haſty concluſions, I procured a third box from Cheſter, which being ſubjected to the ſame trials, ſeemed more impure than either of the other two. This Magneſia formed a very imperfect ſolution in the vitriolic acid; and the taſte of the lime, after calcination, was ſo very diſagreeable, that I was not free from it for ſome hours. The water impregnated with it was as ſtrong to the taſte as common lime-water, and the precipitate which fell from it, on blowing air into it, was as copious as I ever obſerved from that prepared with ſtone or oyſter-ſhell lime. The boxes were all purchaſed from the agents for the ſale of Glaſs's Magneſia, and every box was ſealed with his arms, and had every other mark of authenticity. I have retained ſamples of each in both ſtates.

I have ſince repeated the above experiments on the contents of two boxes of Glaſs's Magneſia, the one of which was purchaſed of Mr. R. Davis, in Sackville-ſtreet, Piccadilly, the other of Mr. William Nicoll, in St. Paul's Church-yard. The Magneſia in each proved to be calcareous, and acquired the properties of quick-lime by calcination.

It would be natural for every perſon, who might wiſh to give the Calcined Magneſia a fair trial, to obtain Mr. Glaſs's for that purpoſe, on the ſuppoſition of its being ſuperior to any other; and as the very firſt taſte of it, in that ſtate, would be ſufficient to prejudice any one againſt the farther uſe of it, I am neceſſitated, in juſtice to my own reputation, and to the public, who may otherwiſe be deprived of a very valuable medicine, to enter this proteſt againſt the uſe of it.

I have fairly and candidly given up to the public what I have found to be the beſt method of preparing Magneſia, ſufficiently pure for every medical and chemical purpoſe; and I ſincerely wiſh that every apothecary, who has opportunity and leiſure, would prepare it himſelf. But as, from various reaſons, there are, I am convinced, too many who omit to do it, and that too little attention is paid to examining into the purity of what is uſed; and as it alſo appears the public have been impoſed on, where they had reaſon to think themſelves moſt ſecure, I have ſent to Mr. Johnson, No. 72, St. Paul's Church-yard, and Mr. Ridley in St. James's-ſtreet, a quantity of Magneſia, both in a calcined and uncalcined ſtate, which, though not *equal in levity*, nor quite ſo coſtly, even when calcined, as that ſold as Mr. Glaſs's, will, I doubt not, prove to be non-calcareous, and ſuperior to it in every other reſpect. And if it ſhould appear ſo to the gentlemen of the faculty, I wiſh for no preference to thoſe apothecaries who prepare the medicine faithfully; but flatter myſelf that I have a ſuperior title to the favour of phyſicians, of my brethren, and of the community, than thoſe perſons can claim, who have meanly ſtooped to ſecrete a proceſs, the knowledge of which muſt be beneficial to mankind, and have abuſed the public confidence.

I ſhall only add, that ſo far was I from expecting to find Mr. Glaſs's Magneſia impure, that I bought it as a ſtandard; that, as I am informed that Gentleman is dead ſince this inquiry was finiſhed, nothing, leſs than the reaſons I have adduced, could have prevailed on me to have publiſhed this Appendix at this ſeaſon; and that I do not conſider him, but the preſent preparers of the Medicine, as culpable for the adulteration. That I have been favoured with an account of ſome experiments made by a Phyſician of conſiderable eminence, on that Magneſia, the reſult of which was ſimilar to what I have here recited; and I appeal for proof of the truth of what I have aſſerted, to every reputable perſon who may now have any of it in his poſſeſſion, and will make the experiment; and that having reſted my cauſe on that iſſue, I mean not to enter into any controverſy on the ſubject.

N. B. Calcareous Magneſia is neither ſo abſorbent, nor ſo purgative as the pure.

FINIS.